Fact Sheet

Watershed-Scale Pollutant Loading Model—AnnAGNPS v3.4

Annualized AGricultural Non-Point Source Pollutant Loading Model, version 3.4

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Description

The Annualized Agricultural Non-Point Source Pollution Model (AnnAGNPS) is a continuous simulation watershed-scale program. It is an expansion of the capabilities in the single event model AGNPS. It is the pollutant loading model in the suite of models for AGNPS. To use AnnAGNPS, the watershed is subdivided into homogenous land areas with respect to soil type, land use, and land management. Areas can be of any shape including hydrologically-based or square grid (as was used in AGNPS). AnnAGNPS simulates quantities of surface water, sediment, nutrients, and pesticides leaving the land areas (cells) and their subsequent travel through the watershed. Some of the sediment, nutrients, and pesticides will reach the watershed outlet while the remainder will be deposited in the stream system. Calculations are done on a daily time step. Runoff quantities are based on runoff curve number while sediment is determined using RUSLE. Special components are included to handle concentrated sources of nutrients (feedlots and point sources), concentrated sediment sources (gullies), and added water (irrigation). Output is expressed on an event basis for selected stream reaches and as source accounting (contribution to outlet) from land or reach components over the simulation period.

Uses

AnnAGNPS can be used to evaluate non-point source pollution from agricultural watersheds. It can compare the effects of implementing various conservation alternatives over time within the watershed. Alternative cropping and tillage systems, fertilizer, pesticide, and irrigation application rates, point source loads and feedlot management can be evaluated.

The model partitions soluble nutrients and pesticides between surface runoff and infiltration. Soluble nutrients from feedlots are also transported with runoff. Sediment-transported nutrients and pesticides are also determined. The sediment determined for the land areas and gullies is subdivided into particle size classes (clay, silt, sand, small aggregate, and large aggregate) before being added to the stream system. Particle sizes are routed separately in the stream reaches.

Output parameters (water, sediment, nutrients, and pesticides) are selected by the user for the desired watershed source locations (specific cells, reaches, feedlots, point sources, and gullies) for simulation period source accounting. Source accounting indicates the fraction of a pollutant loading at the watershed outlet that came from the user identified watershed source location. Multiple watershed source locations can be identified, each with its own set of output parameters. User-selected pollutant loadings can be determined at desired stream reach locations for each runoff event.

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Features

A separate Windows-based flow network generator (using DEMs) can be used to subdivide the watershed into hydrologically-derived cells and provide basic land & stream system information such as drainage areas, slopes, elevations, reach lengths, & other parameters.

A separate Windows-based input editor assists in generating or modifying AnnAGNPS input data.

Input can be in either all English or all metric units. The same is also true for output.

No preset limit on the number of cells, reaches, or length of simulation period. Available computer memory will determine the complexity of a simulation that can be run.

Flexible input allows for data to be entered by type of data using section headers. There is no fixed order for assembling the various section headers in the input file.

Separate input files for watershed data (AnnAGNPS input) and simulation period climate data (daily climate data) allows for quick changing of climate data.

Input data converter for old single-event AGNPS data to AnnAGNPS input.

Extensive data checks (with appropriate error messages) are performed as data is read and, to a lesser extent, after all data is read.

Use of identifier names for most section head data types allows for reuse of data for several cells (or reaches) in the watershed.

Limitations

All runoff and associated sediment, nutrient, and pesticide loads for a single day are routed to the watershed outlet before the next day simulation.

There is no tracking of nutrients and pesticides attached to sediment deposited in stream reaches from one day to the next.

Point sources are limited to constant loading rates (water and nutrients) for entire simulation period.

System Requirements

AnnAGNPS is available as a 32-bit version for Windows 98, NT, 2000, and XP. AnnAGNPS could also be used on other platforms that have a compiler for ANSI standard Fortran 95. The executable program is approximately 2 MB. A Pentium or higher PC with a minimum of 32 MB of memory is recommended because of Windows requirements. There is no memory limitation for AnnAGNPS because it includes a memory manager with virtual memory capabilities. Additional free disk storage considerations should include input file and output file needs (and virtual memory if used).

Planned Development

Complete the implementation of the winter routines.

Update to RUSLE 2.0 technology within AnnAGNPS and enhanced ephemeral gully routines.

Integration of stream corridor buffers technology (Riparian Ecosystem Management Model-REMM).